JUNE 2001

BLACK BOX®
NETWORK SERVICES

Multi-Head BLACK BOX® ServSwitch™

SW614A
SW616A
SW617A
SW619A

Customer Support Information:
FREE tech support 24 hours a day, 7 days a week: Call **724-746-5500** or fax **724-746-0746**.
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BLACK BOX®
NETWORK SERVICES

Welcome to the ServSwitch™ Family!

Thank you for purchasing a BLACK BOX® ServSwitch™ Brand KVM switch! We appreciate your business, and we think you'll appreciate the many ways that your new ServSwitch keyboard/video/mouse switch will save you money, time, and effort.

That's because our ServSwitch family is all about breaking away from the traditional, expensive model of computer management. You know, the one-size-fits-all-even-if-it-doesn't model that says, "One computer gets one user station, no more, no less." Why not a single user station (monitor, keyboard, and mouse) for multiple computers—even computers of different platforms? Why not a pair of user stations, each of which can control multiple computers? Why not multiple user stations for the same computer?

With our ServSwitch products, there's no reason why not. We carry a broad line of robust solutions for all these applications. Do you have just two PCs, and need an economical alternative to keeping two monitors, keyboards, and mice on your desk? Or do you need to share dozens of computers, including a mix of IBM® PC, RS/6000®, Apple® Macintosh®, Sun Microsystems®, and SGI® compatibles among multiple users with different access levels? Does your switch have to sit solidly on a worktable and use regular everyday cables? Or does it have to be mounted in an equipment rack and use convenient many-to-one cables? No matter how large or small your setup is, no matter how simple or how complex, we're confident we have a ServSwitch system that's just right for you.

The ServSwitch™ family from Black Box—the one-stop answer for all your KVM-switching needs!

*

This manual will tell you all about your new Multi-Head ServSwitch™, including how to install, operate, and troubleshoot it. For an introduction to the Switch, see **Chapter 2**. The Multi-Head ServSwitch product codes covered in this manual are:

SW614A SW616A
SW617A SW619A

This manual also includes information about the Remote-Control Module accessory, which has its own installation and operation sheet. The Remote-Control Module product codes mentioned in this manual are:

KV6REM KV6REM-25 KV6REM-50 KV6REM-75

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Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Shielded cables must be used with this equipment to maintain compliance with radio-frequency energy-emission regulations and ensure a suitably high level of immunity to electromagnetic disturbances.

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(a) Reorient or relocate the receiving antenna.

(b) Increase the separation between the equipment and the receiver.

(c) Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.

(d) Consult the supplier or an experienced radio / TV technician for help.

Shielded cables must be used with this equipment to maintain compliance with radio-frequency energy-emission regulations and ensure a suitably high level of immunity to electromagnetic disturbances.

CE

NORMAS OFICIALES MEXICANAS (NOM)
ELECTRICAL SAFETY STATEMENT

INSTRUCCIONES DE SEGURIDAD

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.
2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.
3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.
4. Todas las instrucciones de operación y uso deben ser seguidas.
5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc.
6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.
7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.
8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá a lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.
9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.
10. El equipo eléctrico deber ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.
11. El aparato eléctrico deberá ser connectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.

12. Precaución debe ser tomada de tal manera que la tierra fisica y la polarización del equipo no sea eliminada.

13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.

14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.

15. En caso de existir, una antena externa deberá ser localizada lejos de las lineas de energia.

16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.

17. Cuidado debe ser tomado de tal manera que objectos liquidos no sean derramados sobre la cubierta u orificios de ventilación.

18. Servicio por personal calificado deberá ser provisto cuando:

    A: El cable de poder o el contacto ha sido dañado; u

    B: Objectos han caído o líquido ha sido derramado dentro del aparato; o

    C: El aparato ha sido expuesto a la lluvia; o

    D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o

    E: El aparato ha sido tirado o su cubierta ha sido dañada.

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1. Specifications

Compliance:	CE (EN55022 Class B); FCC Part 15 Subpart J Class A, IC Class / classe A
Standards:	VGA, SVGA, XGA, XGA-2, SXGA, or UXGA video; supports VESA DDC, DDC1, and DDC2 signaling
Interfaces:	Video: VGA; Keyboard and mouse: IBM PS / 2 compatible; with appropriate adapters, also supports IBM PC / AT type keyboards, CPUs with PC / AT keyboard ports, and CPUs with EIA / TIA RS-232 mouse ports; OPTIONS port: EIA / TIA RS-232 proprietarily pinned on DB15
Resolution:	Up to 1600 x 1280 noninterlaced at up to 100 Hz
Protocol:	RS-232: Asynchronous
Data Format:	RS-232: 8 data bits, no parity, 1 stop bit
Data Rate:	RS-232: 1200 bps
Flow Control:	RS-232: None
Maximum Distance:	10 m (32 ft.) to any attached keyboard, mouse, or monitor; 30 m (100 ft.) to any attached CPU
User Controls:	Keyboard commands; Mouse-click functions; (1) Front-mounted pushbutton for channel change and configuration mode; (1) Bottom-mounted 8-position DIP switch for reset and firmware upgrade
Indicator:	(1) Front-mounted 7-segment status display

Connectors:	All rear-mounted: (1) Multipurpose DB15 female (see **Section A.3** of the **Appendix**); (1) Barrel jack for optional power-supply connection; User port consisting of: (2) 6-pin mini-DIN female for keyboard and mouse attachment; SW614A, SW617A: (2) HD15 female for monitor attachment; SW616A, SW619A: (4) HD15 female for monitor attachment; CPU ports ([2] on SW614A and SW616A, [4] on SW617A and SW619A), each consisting of: (2) 6-pin mini-DIN female for keyboard- and mouse-port attachment; SW614A, SW617A: (2) HD15 female for video-head attachment; SW616A, SW619A: (4) HD15 female for video-head attachment
MTBF:	500,000 hours (based on the historical reliability of similarly designed and manufactured products)
Maximum Altitude:	10,000 ft. (3048 m)
Temperature Tolerance:	32 to 104˚F (0 to 40˚C)
Humidity Tolerance:	5 to 60% noncondensing
Enclosure:	Steel, aluminum, and plastic

Power — Either:

- 5 VDC at up to 500 mA from the keyboard interfaces of the attached computers, or
- From the optional power supply PS649 (not included):

  Input: 100 to 240 VAC at 50 to 60 Hz from utility-power (mains) outlet, through detachable power cord and IEC 320 male inlet, to external transformer;

  Output: 5 VDC at up to 1 A;

Consumption: 5 watts maximum

Size: 4.1"H x 10.3"W x 5.9"D (10.4 x 26.2 x 15 cm)

Weight: 5.5 lb. (2.5 kg)

2. Introduction

The Multi-Head ServSwitch™ is a high-performance keyboard-, mouse-, and monitor-sharing device that supports a wide range of IBM® PC compatible hardware with multiple video outputs. Four models are available:

- 2-Port Dual Video (product code SW614A) for switching between two dual-head CPUs;
- 2-Port Quad Video (SW616A) for switching between two quad-head CPUs;
- 4-Port Dual Video (SW617A) for switching between four dual-head CPUs; and
- 4-Port Quad Video (SW619A) for switching between four quad-head CPUs.

2.1 Features and Benefits

Here are some of the useful features of the Multi-Head ServSwitch and some of the ways those features benefit you:

- Control multiple computer CPUs with two to four video outputs from a single keyboard, mouse, and set of monitors.
- Continuous keyboard and mouse emulation on all ports ensures problem-free computer bootup. And because all ports are simultaneously active, all attached CPUs can be booted at the same time.
- Can usually draw all the power it needs from the attached CPUs. For demanding applications with high-end video, etc., an optional power supply (product code PS649) is available.
- Intelligent switching: You can scan/switch between all ports or just the active ones.
- Flash-upgradable for easy on-site firmware upgrades.
- Supports high-bandwidth monitors, at resolutions up to 1600 x 1280 pixels and refresh rates up to 100 Hz, with low distortion.
- Video channels support Display Data Channel (DDC/DDC1/DDC2) signaling.
- Password security prevents unauthorized use.
- Local channel switching using its front-panel pushbutton, a keyboard hotkey sequence, or a 3-button mouse.
- Remote channel switching through its RS-232 serial port, using its convenient optional Remote-Control Module or some other device.

- Two Switches can be synchronized to handle computers with up to eight video outputs.
- Automatically restores keyboard and mouse states when channel is changed.
- CPUs can have either PS/2 or PC/AT® keyboard ports and either PS/2 or RS-232 mouse ports.
- Supports keyboard modes 1, 2, and 3, as well as both "prompt" and "stream" mouse modes, for maximum compatibility.
- Support for Microsoft® IntelliMouse™ and many other "wheel mice."
- Mouse-restoration functions that make it possible to hot-plug certain systems.
- Supports IBM RS/6000®, Compaq® Alpha®, and SGI™ computers.
- Compatible with all popular operating systems for the IBM PC.
- Includes screen-blank, autoscan, and variable-hotkey options.
- Metal enclosure for good shielding and video quality.
- Can be soft-reset if problems occur.

2.2 The Complete Package

The only other thing that comes with the Multi-Head ServSwitch is this manual. (We don't include a power supply because most applications don't require one. If you need a power supply for the Switch, it can be purchased separately as product code PS649.)

The only other things that come with the Switch's optional Remote-Control Module (the KV6REM series of product codes—see **Section 5.2**) are Velcro® mounting strips.

2.3 The Multi-Head ServSwitch Illustrated

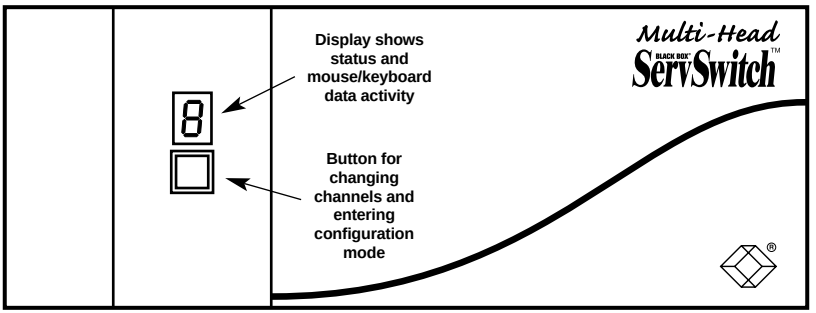

Display shows status and mouse/keyboard data activity
Button for changing channels and entering configuration mode
Multi-Head
ServSwitch

Figure 2-1. The Multi-Head ServSwitch's front panel.

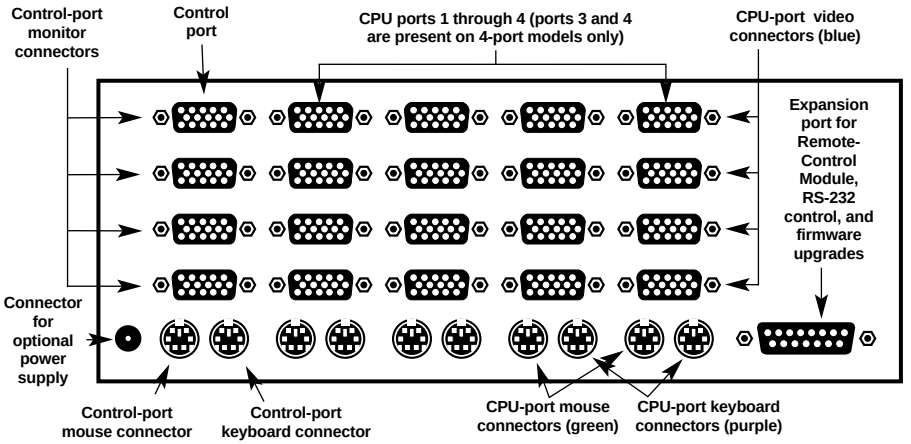

Control-port monitor connectors
Control port
CPU ports 1 through 4 (ports 3 and 4 are present on 4-port models only)
CPU-port video connectors (blue)
Expansion port for Remote-Control Module, RS-232 control, and firmware upgrades
Connector for optional power supply
Control-port mouse connector
Control-port keyboard connector
CPU-port mouse connectors (green)
CPU-port keyboard connectors (purple)

Figure 2-2. The Multi-Head ServSwitch's rear panel (SW619A shown).

The bottom panel of the Multi-Head ServSwitch isn't shown here, but there's an 8-position DIP switch mounted on it. You'll use this switch if you ever do a "warm reset" of the Switch (see **Section 5.10**) or upgrade its firmware (see **Section 5.11**).

You can also use an optional Remote-Control Module with the Multi-Head ServSwitch (see **Section 5.2**). This is what the Module looks like:

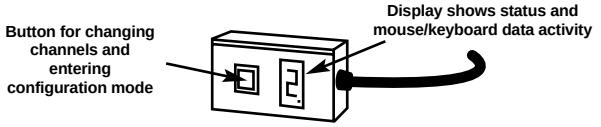


Figure 2-3. The Remote-Control Module (KV6REM).

2.4 Safety Concerns

As you prepare to install the Multi-Head ServSwitch, please keep these things in mind:

- The Switch is for use in dry, oil-free indoor environments only.
- Do *not* attempt to fix the Switch yourself.
- Follow all warnings and instructions marked on the Wizard, its optional power supply, and any other accessories.
- If you'll be using the Wizard's optional power supply:
  - **Warning:** The Switch's power-supply transformer contains *no* user-serviceable parts, but it *does* contain "live" parts capable of delivering hazardous electric shocks—do *not* attempt to dismantle it!
  - Make sure that the total current rating of the devices plugged into the AC outlet that's supplying the Switch is not greater than the outlet's rated current capacity.
  - If you use an extension cord with the power supply, make sure that the total current rating of the devices plugged into the extension cord is not greater than the cord's rated current capacity.
  - Do *not* continue to use the Switch's power supply if its transformer's case becomes damaged, cracked, or broken, or if you suspect that the power supply isn't operating properly.
  - If the Switch's power supply stops working, replace it with a manufacturer-approved power supply of the same type only.

3. Installation

3.1 What You Will Need

You'll need these things to be in place before you can install your Multi-Head ServSwitch:

- Cables to connect the Multi-Head ServSwitch to the keyboard, mouse, and video ports of each of your computers. (You don't need to connect mouse cabling to a CPU if you're not using a mouse with that CPU.) You'll need adapters to connect the Switch to the keyboard and mouse ports of PC/AT style computers. For cable and adapter specifications, see the **Appendix**.

- Monitors with a standard VGA (HD15) connector that will work when connected directly to each of your computers. The Multi-Head ServSwitch supports low- and high-resolution monitors.

- A standard PC/AT or PS/2 style keyboard. (If you're using an AT keyboard with a 5-pin DIN connector, you'll need a standard AT to PS/2 keyboard adapter—product code FA211—to connect it to the Multi-Head ServSwitch.)

- A PS/2 style two- or three-button Microsoft® or Logitech™ compatible mouse or a Microsoft IntelliMouse® or IntelliMouse Explorer compatible mouse. If you want to use the mouse to switch channels on the Multi-Head ServSwitch, you'll need a three-button mouse or an IntelliMouse. (The Switch supports other IntelliMouse compatible "Internet mice"—fitted with a wheel or other scrolling control, and sometimes additional buttons—that are available from several manufacturers.)

  All of the mouse connections from Multi-Head ServSwitch to the attached computers support either PS/2 mouse ports or RS-232 serial mouse ports. The Switch automatically converts PS/2 mouse data and commands to serial-mouse data and commands, but you'll still need the appropriate adapter—product code FA314—to connect the Switch to a PC with a serial mouse port. See **Section A.2** in the **Appendix**.

  The Switch will operate without a mouse connected if you don't want to use one.

- A suitable mouse driver for your PCs. Supported types are:
  - PS/2 or RS-232 two-button mouse driver by any manufacturer.
  - Microsoft mouse drivers, including those for the IntelliMouse. (You might be able to user other drivers with IntelliMouse compatible data formats, but these might not work—trial-and-error testing might be necessary.)
  - Logitech mouse drivers, including those for two-button, three-button, and wheel mice.

3.2 Placement

The Multi-Head ServSwitch should be placed on a desktop or shelf near your monitors and peripherals. You can use the optional Remote-Control Module if you want to put a Switch farther from your monitors and peripherals.

3.3 Connecting Your Equipment

NOTES

When you connect devices to Switches' "control ports" and "CPU ports," refer to Figure 2-2 in Section 2.3 **to see where these ports are.**

Any unused CPU-port or control-port connectors on a Multi-Head ServSwitch can be left vacant.

Feel free to mix computers with multiple video outputs and computers with single outputs in your Switch system. When you switch to a CPU with a single output, that output will be displayed on the first monitor and the additional monitors will be blank.

Most Multi-Head ServSwitch applications will involve a keyboard, a mouse, a set of two to four monitors, and two to four computer CPUs attached to a *single* Wizard. If that describes what you want to do, follow the procedure in **Section 3.3.1**.

If your CPUs have more than four video outputs (up to as many as eight), you will need two *synchronized* Switches to switch between the CPUs. Follow the procedure in **Section 3.3.2**.

You might want to use Premium KVM User or CPU Cables to attach your devices, and you might need adapters for PC/AT style equipment. These cables and adapters are described in **Section 3.3.3**.

NOTE

It is theoretically possible to cascade Multi-Head ServSwitches in order to switch between more than four CPUs. It is also theoretically possible to synchronize more than two Multi-Head ServSwitches in order to handle CPUs whose video cards have more than eight video heads. But in each case, cabling would be very complex. If you feel that you need to install such a system, please call Black Box Technical Support.

3.3.1 Basic Systems with a Single Switch

Make sure that the Multi-Head ServSwitch is unplugged and powered down. If possible, turn off and unplug all of the devices that you want to attach to it. (If you have to "hot-plug" any powered computers into the Switch, see **Section 5.8**.)

Connect your user equipment (keyboard, PS/2 mouse, and monitors) to the appropriate "control port" connectors on the Switch's rear panel. If you have had to place the Switch farther from the user equipment than the equipment's native cables will reach—up to an additional distance of 30 ft. (9 m)—you can plug the keyboard, mouse, and the first monitor into Premium KVM User Cable. (Use VGA extension cable to connect your other monitors.)

Next, connect each computer CPU to the Switch by running cabling from the CPU's keyboard, mouse, and video ports to the matching connectors in one of the Switch's "CPU ports." You can use PS/2 extension cables to attach the keyboard and mouse ports, plus video-extension cables to attach the video ports. But we recommend using our three-in-one Premium CPU Cable to attach the keyboard port, mouse port, and primary video port at all the same time, at distances up to 100 ft. (30 m). Use VGA extension cable to connect your CPUs' other video ports.

If you need to place your user equipment farther than 30 ft. (9 m) from the Switch, or if you need to place a CPU farther than 100 ft. (30 m) from the Switch, please call Black Box Tech Support for help determining your best extension options.

Figure 3-1 shows a sample Switch system. For clarity, only one CPU is shown.

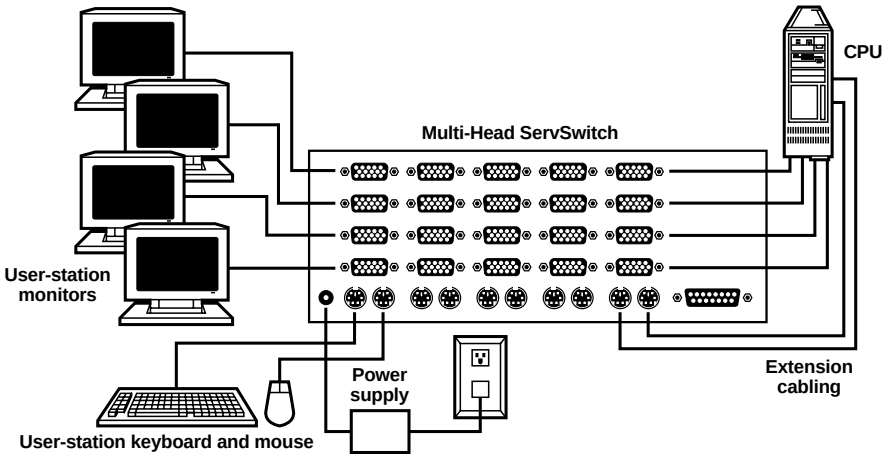


Figure 3-1. A Multi-Head ServSwitch system (SW619A shown).

3.3.2 Synchronized Switch Systems for CPUs with up to Eight Video Outputs

Some CPUs and video cards can support a very large number of simultaneous video outputs. CPUs with more than four video heads can't be supported by a single Multi-Head ServSwitch. But two Switches can be "synchronized" to handle CPUs with as many as eight video heads.

Here's how it works: When you switch to a different CPU channel, the Multi-Head ServSwitch transmits the same switching command out of its RS-232 port. Any other Multi-Head ServSwitch receiving this command will make the same channel change. So you can connect a CPU's additional video outputs to an additional Switch, then interconnect the Switches' RS-232 ports to create a synchronized switching system that switches all video feeds coming from each CPU at the same time.

(Note that *each* Switch in a synchronized system *must* be powered through a power supply and *not* by the CPUs' keyboard interfaces.)

Make sure that your "master" Multi-Head ServSwitch—the chassis that your keyboard and mouse will be attached to—is unplugged and powered down. If possible, turn off and unplug all of the devices that you want to attach to this Switch. (If you have to "hot-plug" any powered computers into your Switch system, see **Section 5.8**.)

Connect your primary user equipment (your keyboard, your PS/2 mouse, and the first four of your monitors) to the appropriate "control port" connectors on the master Switch's rear panel. If you have had to place the Switch farther from the user equipment than the equipment's native cables will reach—up to an additional distance of 30 ft. (9 m)—you can plug the native cables into Premium KVM User Cable. If you need to place your user equipment farther away than that, please call Black Box Tech Support for help determining your best extension options.

Attach all other monitors you'll be using to the control-port video connector on the rear panel of another Switch. As with your primary user equipment, use video-extension cable or Premium KVM User Cable to cross gaps up to 30 ft. (9 m).

Connect this secondary Switch to your master Switch with DB15 cable. If your CPUs don't output more than eight video feeds, so that you only need to synchronize these two Switches, you can use a special male-to-male DB15 synchronization cable (available on a quote basis; see **Section A.3** of the **Appendix** for a pinout). But if your CPUs output nine or more video feeds, you'll need to use pass-through, multi-drop, or preferably one-to-many DB15 cabling to interconnect three or more Switches; call Black Box Tech Support to discuss your application.

Connect each computer CPU to the synchronized Switch system. First run cabling from the CPU's keyboard port, mouse port, and first four video outputs to the matching connectors in one of the master Switch's "CPU ports." This cabling can be either separate male-to-male keyboard-, mouse-, and video-extension cables, or our three-in-one Premium KVM CPU Cable. If you need to run farther than 100 ft. (30 m) to a CPU, please call Black Box Tech Support for help determining your best extension options.

Finally, connect the additional video outputs from each CPU to the video connectors in the CPU ports of the secondary Switch. For correct switching, *make sure* to connect all of the video outputs from the same CPU to same-numbered ports on your synchronized Switches. As with your first CPU-video connection, these connections can be made with video-extension cable or Premium KVM CPU Cable for distances up to 100 ft. (30 m).

Figure 3-2 features a complete synchronized Switch system. For clarity, separate keyboard-, video-, and mouse-extension cables are shown.

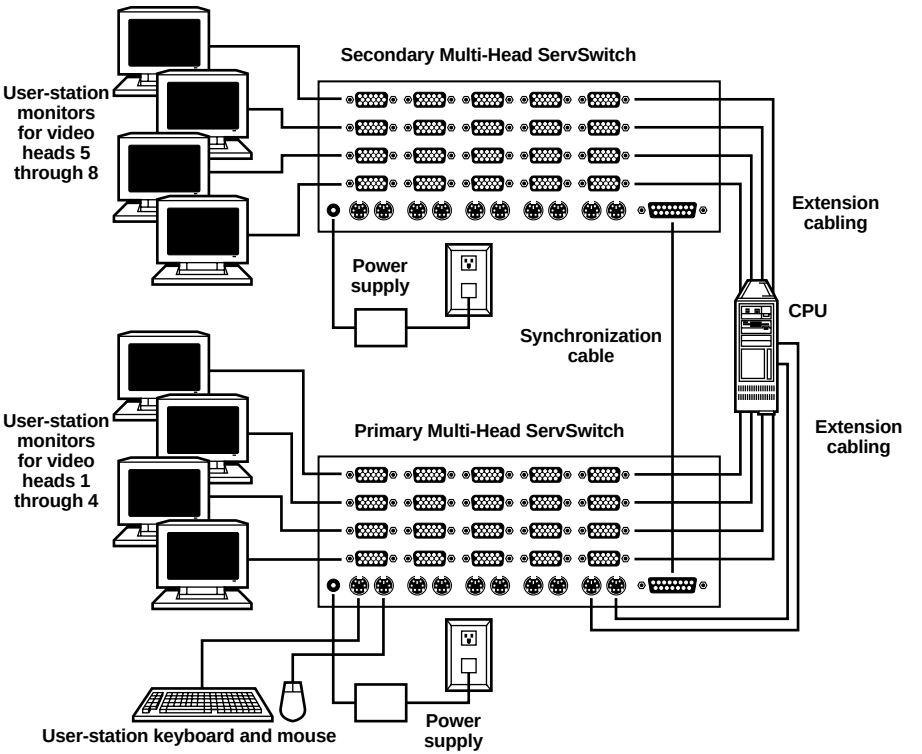


Figure 3-2. A synchronized system with two Multi-Head ServSwitches.

3.3.3 Cables and Adapters

Attaching a CPU's 6-pin mini-DIN keyboard and mouse ports and its two or more HD15 video ports to the Multi-Head ServSwitch will require extension cables. You can use HD15 male-to-male VGA-extension cables (product code EVNPS05-MM) to make the video-port connections; one of these cables will be *required* for each video-port connection after the first. And you can use 6-pin mini-DIN male-to-male PS/2 extension cables (EVNPS03-MM) to make the keyboard- and mouse-port connections.

But we suggest that you use a Premium KVM CPU Cable to connect the Switch to each CPU's keyboard and mouse ports and the first of its video ports. Premium KVM CPU Cables (EHN408) come in 5-ft.(1.5-m), 10-ft. (3-m), 20-ft. (6.1-m), 30-ft. (9.1-m), 50-ft. (15.2-m), and 100-ft. (30.5-m) lengths. You'll still use EVNPS05-MM VGA-extension cables to connect the Switch to each CPU video port after the first one.

Similarly, while it's possible to use separate HD15 male-to-female VGA-extension cables (EVNPS05-MF) and 6-pin mini-DIN male-to-female PS/2 extension cables (EVNPS03-MF) to extend the distance from the Switch to your user equipment, we recommend using Premium KVM User Cables (EHN409) to run from the Switch to your keyboard, mouse, and first monitor. Premium KVM User Cables come in 10-ft. (3-m), 20-ft. (6.1-m), and 30-ft. (9.1-m) lengths. You'll still use EVNPS05-MF VGA-extension cables to connect the Switch to each monitor after the first one.

Both types of Premium KVM Cable are built to the special three-in-one design shown in Figure 3-3 on the next page. The central coaxial video strand of each cable is molded to the keyboard and mouse strands on either side, and the ends of its video strand are one inch (2.5 cm) longer than the ends of the other strands, so that the weight of the composite cable can be borne by the video connector's screwlocks. To help you tell the otherwise identical keyboard and mouse strands apart, they're labeled "K" and "M" respectively. Also, at the time of this writing, the keyboard strand is colored orange while the mouse strand is colored green, but the colors of the strands or connectors might be changed at some point to conform to PC-interface color specifications such as PC99.

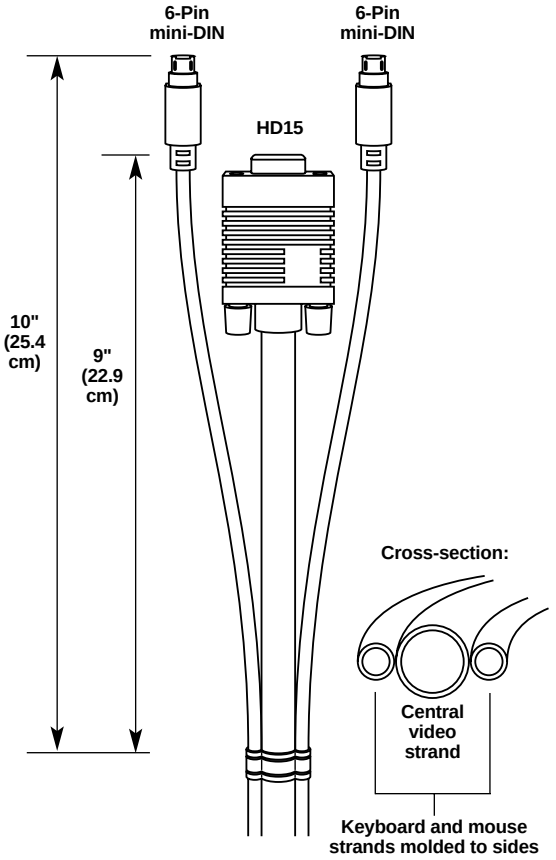


Figure 3-3. The Premium KVM cables.

To connect computers with serial mouse ports and/or PC/AT style keyboard ports, you'll need adapters like those shown in Figure 3-4. Refer to the **Appendix**.

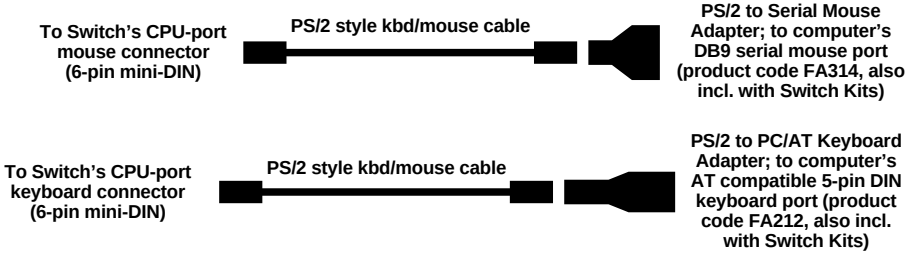


Figure 3-4. Using PC/AT keyboard-port and serial-mouse-port adapters.

3.4 Powering the Switch

Once you've installed your Multi-Head ServSwitch system and attached your equipment to it, you need to apply power to each Switch. You can do this in either of two ways. Most basic systems should be able to get the power they need from the attached CPUs. However, you might need to power the Switch(es) in your system with the optional PS649 power supply, especially if the system (a) runs long cable distances to equipment, (b) uses high-resolution video, or (c) is synchronized.

If you're powering a Switch with the attached CPUs: Power up the CPUs. The Switch (which has no ON/OFF switch) might be able to start operating automatically; it can draw power from the attached CPUs' keyboard interfaces, and a single cable connection to a CPU's keyboard port is usually sufficient to power the Switch if the cable isn't more than 3 meters (10 feet) long. (If more than one computer is connected to the Switch, you'll probably be able to use longer cables; the Switch will draw power intelligently from all attached computers.) As you power up your CPUs, watch the Switch's 7-segment display as discussed in **Section 5.1**: If it shows the number "1" or the letter "P," the Switch will be able to operate using the power it's receiving from the CPUs, but if it's blank, the Switch is not getting enough power from the CPUs, and you'll have to either use the power supply or swap in shorter CPU cables.

*If you **are** using the power supply:* Plug the power supply's output cord into the power jack on the back of the Multi-Head ServSwitch, then attach the input cord to the power-supply transformer's IEC 320 inlet. Then plug the input cord into utility (mains) power. (In this situation, always apply power to the Multi-Head ServSwitch *first, then* power on the monitors and each of the computers. If you power up the computers before the Switch, the computers might not recognize the presence of the mouse or keyboard.) The Switch should start operating immediately; it has no ON/OFF switch.

4. Configuration

To configure your Multi-Head ServSwitch system, you'll need to configure first the attached PCs, as directed in **Section 4.1**, then the Switch itself, as directed in the rest of this chapter.

IMPORTANT NOTE

Throughout the rest of this manual, the [Enter] designation refers to the main "enter" or "carriage-return" key (often labeled "↵") on the main section of the keyboard. Do not use the "Enter" key on the numeric keypad or the extra "Enter" key found on the main section of some specialized keyboards.

4.1 Configuring Your PCs

Configure your PCs in the same way that you would if your keyboard, mouse, and monitors were all connected directly to your PCs. Keep in mind that the Multi-Head ServSwitch emulates Microsoft compatible serial, IntelliMouse, and PS/2 mice; so you'll need to make sure that your PC software is configured for a Microsoft mouse of the correct type. Refer to the list of supported drivers in **Section 3.1**.

4.2 Configuring the Multi-Head ServSwitch

The Multi-Head ServSwitch comes from the factory preset to default configuration settings which are suitable for most applications. If you need to set the Switch differently, you can access its "configuration mode" to do so; once you do, the new settings are stored in the Multi-Head ServSwitch's EEPROM memory and are retained when the Switch is powered OFF.

4.2.1 Entering Configuration Mode

You can access the Multi-Head ServSwitch's configuration mode in either of two different ways: Use one method when you power up the Switch; use the other while the Switch is operating.

- To enter configuration mode at power-up, make sure that the Multi-Head ServSwitch and all attached computers are turned OFF and unplugged. Hold down the front-panel pushbutton while you plug in the Switch (if you're using the optional power supply) or power up one or more of the attached CPUs (if you're *not* using the Switch's power supply); do *not* release the button until the Multi-Head ServSwitch displays "C" to show that it is in configuration mode.

- To enter configure mode while the Multi-Head ServSwitch is running, hold down its front-panel pushbutton for 5 seconds until the front-panel display shows "C".

In configuration mode, you can change settings by typing a single-letter command (for a given feature), followed by a single-digit numeric argument (for how you want that feature to behave), followed by the [Enter] key. Press the [Esc] (escape) key to abort a setting change before you fully enter it. The Multi-Head ServSwitch will remain in configuration mode until you type the letter "E" followed by [the Enter] key.

For example: To set the hotkey sequence to option #2 ([Ctrl] + [Shift] + command key), type [H][2][Enter] while the Multi-Head ServSwitch is displaying "C", then type [E][Enter] to exit configuration mode.

The remaining sections of this chapter describe the Switch's user-configurable settings.

4.2.2 SETTING THE SCREEN-SAVER TIMEOUT

The Multi-Head ServSwitch has a programmable screen-saver function which will blank the displays on the shared monitors after a certain time elapses with no activity on the shared keyboard or mouse.

The Switch's front-panel display will flash while the Switch is in screen-saver mode. To restore the blanked monitor display, just type at the keyboard or move the mouse. Use the "B" command (type [B] [*digit*] [Enter]) to set how long the Multi-Head ServSwitch waits for keyboard or mouse activity before activating the screen saver:

B1 Screen saver disabled (default)

B2 Screen saver is activated after 1 minute of inactivity

B3 2 minutes

B4 4 minutes

B5 8 minutes

B6 12 minutes

B7 16 minutes

B8 20 minutes

4.2.3 AUTOSCANNING: SETTING THE SCAN MODE AND PAUSE TIME

The Multi-Head ServSwitch begins autoscanning its CPU channels (that is, briefly displaying each channel's video feeds in turn) when you type in the hotkey sequence followed by the letter "A" (see **Section 5.5**). By default, the Switch only scans those channels that have a powered-up computer connected to them. But if you need the Switch to scan all of its channels, you can send it the [L][2] or [L][4] command. (In these settings, when the Switch scans a channel that has no computer attached, or a channel whose attached computer is off or just not outputting video, the shared monitors will display a blank screen.) Also, if you want the Switch to start autoscanning as soon as it powers up, instead of waiting for the "A" command, you can send it the [L][3] or [L][4] command.

L1 Multi-Head ServSwitch only scans active ports during autoscanning (default)

L2 Multi-Head ServSwitch scans every one of its ports during autoscanning

L3 Multi-Head ServSwitch powers on in autoscan mode and scans active ports only

L4 Multi-Head ServSwitch powers on in autoscan mode and scans all ports

CAUTION!

Many modern monitors are fitted with automatic power-saver relays and will automatically blank their displays after a short time if the computer they're communicating with becomes idle. If you are using any such monitors, you should not use the Switch's L2 or L4 setting unless you can set the monitors' power-saver timeout to an interval longer than the Switch's autoscan pause time (see below), because if the monitors keep going in and out of power-saver mode during autoscanning, the constant switching ON and OFF of their relays will eventually damage the monitors.

While autoscanning, the Switch will pause at each channel to display that channel's video signals for the duration of the currently selected autoscan-pause time:

T1 During autoscan, the Switch pauses at each channel for 2 seconds (default)

T2 5 seconds

T3 7 seconds

T4 10 seconds

T5 15 seconds

T6 20 seconds

T7 30 seconds

T8 60 seconds

To get out of autoscan mode, simply select a fixed channel using the Switch's front-panel pushbutton, the keyboard hotkeys, or the mouse.

4.2.4 ENFORCING MOUSE SPEED

In its factory-default state, the Multi-Head ServSwitch allows each CPU to handle mouse communication any way the CPU wants to. However, some CPUs with particular rare combinations of operating systems, mice, and mouse drivers can be abnormally sensitive to small timing changes in mouse communication. These CPUs can react badly to the presence of the Switch, making persistent timing errors that cause the mouse to seem slow or sluggish. This has especially been noted to occur while using Logitech mice with some HP® Vectra® machines running later versions of Windows NT® and Logitech mouse drivers.

One way to fix this problem is to change the mouse driver. But if this isn't an option, at least in the short term, you can send the Switch the [L][6] command. This causes the Switch to take a more active role in mouse communication, ensuring that the CPU won't have timing problems and keeping the mouse up to speed.

L5 Multi-Head ServSwitch allows CPU to react to the mouse at any speed (default)

L6 Multi-Head ServSwitch forces normal mouse speed

4.2.5 SETTING MOUSE-MODE REPORTING AND ENABLING/DISABLING MOUSE SWITCHING

In the Multi-Head ServSwitch's factory-default state, you can use a three-button PS/2 mouse or an IntelliMouse to cycle through the Switch's CPU channels. To switch to the next channel, simply hold down the center or "wheel" button on the mouse, then press its left button. If you don't want to use this feature—particularly if it's going to conflict with mouse-controlled application functions—you can disable it by sending the [U][2], [U][3], or [U][5] command. If the third button on a three-button mouse is being used to switch the Switch, it won't be available for use with PC software, although the wheel on an IntelliMouse can be used for both switching and software with no problems. For this reason, we've included the [U][1], [U][2], and [U][4] command options, which cause the Switch to report to the attached PCs that they are attached to a 2-button mouse. If you want to use all the functions of a 3-button mouse or IntelliMouse for your PC software, you should send the Switch the [U][3] or [U][5] command.

The Multi-Head ServSwitch supports "Internet mice" that are compatible with the Microsoft IntelliMouse. These are fitted with a wheel or other type of scrolling control and sometimes have additional buttons. Many such mice are available from several different manufacturers.

You can connect either a standard PS/2 mouse or an IntelliMouse compatible mouse to the Switch's control port. You can configure your CPUs using Microsoft PS/2 or IntelliMouse drivers in any combination as required.

IntelliMouse features are supported on both PS/2 and RS-232 CPU connections. When you use PS/2 CPU connections, the Switch will automatically configure itself to the type of mouse requested by the driver. If you are using RS-232 CPU connections, you will need to send the [U][4] or [U][5] command to enable the IntelliMouse features.

U1 Channels are mouse-switchable; the Switch reports "2-button mouse" to the attached PCs (default)

U2 Channels are not mouse-switchable; the Switch reports "2-button mouse" to the attached PCs

U3 Channels are not mouse-switchable; the Switch reports "3-button mouse" to the attached PCs

U4 Channels are mouse-switchable; the Switch reports "IntelliMouse" to the attached PCs

U5 Channels are not mouse-switchable; the Switch reports "IntelliMouse" to the attached PCs

4.2.6 CHOOSING ACTIVE PORTS OR ALL PORTS FOR KEYBOARD-TAB AND MOUSE SWITCHING

In the Multi-Head ServSwitch's factory-default state, when you "cycle through" the CPU ports on the Switch by pressing {Hotkeys} + [Tab] or when you switch to the next or previous channel with your mouse, the Switch stops at *every* channel. It does this even if the device attached to a particular channel is off or not outputting video, or even if there *isn't* any device attached to that channel. (The Switch will display a blank screen for such channels.) But if you'd rather have the Switch "skip over" any ports that don't have a powered-up computer connected to them, you can send it the [U][8] command.

U7 Switch to all ports when switching with {Hotkeys} + [Tab] or with the mouse (default)

U8 Switch only to active ports when switching with {Hotkeys} + [Tab] or with the mouse

The U7/U8 setting has no effect on autoscanning (see **Section 4.2.3**) or on switching with {Hotkeys} + [*digit*], with the front-panel pushbutton, or through the RS-232 serial interface.

4.2.7 Setting the Hotkey Sequence

You can access many of the Multi-Head ServSwitch's main functions (such as CPU-channel selection, autoscanning, and locking) by sending commands from the shared keyboard. Each command must start with a "hotkey sequence" (series of keystrokes) that alerts the Switch to interpret the keyboard data that follows it as a command. The default hotkey sequence is [Ctrl] and [Alt] pressed simultaneously. If any of the applications on computers attached to the Switch require this sequence to trigger important application-specific functions, you will have to change the Switch's hotkey sequence with the "H" command (type [H][*digit*][Enter]).

Alternative hotkey sequence #5 is particularly suitable for extended keyboards where additional keys can be programmed to act as combinations of other keys. Such keyboards are supplied with many Gateway™ computers. If you program one of these "spare" keys to produce both hotkey keystrokes, or if you program a set of these keys to produce the hotkey *and* channel-number keystrokes, you'll be able to select channels, lock the Switch, etc., with as few as one or two keypresses.

- **H1** Either of the left and right [Ctrl] keys and either of the left and right [Alt] keys together (default)
- H2 Either of the left and right [Ctrl] keys and either of the left and right [Shift] keys together
- H3 Either of the left and right [Alt] keys and either of the left and right [Shift] keys together
- H4 Right [Alt] key only
- H5 Both the left and right [Alt] keys together
- H6 The left [Ctrl] key and the left [Alt] key together
- H7 The right [Ctrl] and the right [Alt] key together
- H8 No hotkey enabled; the hotkey-dependent functions can't be accessed from the keyboard

4.2.8 VIEWING THE FIRMWARE REVISION, RESTORING MOUSE FUNCTION, OR RESETTING TO FACTORY DEFAULTS

For technical-support purposes, it might be necessary to find out the firmware-release version of the control software in your Multi-Head ServSwitch. Before calling Black Box Tech Support about a problem, you can use the [F][1], [F][2], and [F][3] commands to retrieve this; each of these commands causes the Switch to briefly show one of the digits of the firmware's version number on its front-panel display. For example, if the Switch responds to [F][1][Enter] with the digit "1", to [F][2][Enter] with the digit "0", and to [F][3][Enter] with the digit "2", your Switch is using firmware version 1.02.

You can also restore the function of previously disconnected PS/2 type CPU mouse ports with the [F][5] and [F][6] commands (see **Section 5.8**) and you can reset all of the Switch's configuration options to their factory-default states with [F][8].

F1 Display first digit of firmware-version number

F2 Display second digit of firmware-version number

F3 Display third digit of firmware-version number

F4 (Reserved for future use)

F5 Restore PS/2 mouse function to the currently selected CPU's mouse port

F6 Restore IntelliMouse function to the currently selected CPU's mouse port

F7 (Reserved for future use)

F8 Reset all configuration options to their factory-default settings (the Switch will briefly show the letter "r" on its front-panel display to indicate that this has been completed)

4.2.9 Setting the Password

There are many situations where access to corporate file servers or sensitive information needs to be controlled. In such circumstances, the Multi-Head ServSwitch can be locked away in a room or secure cabinet and controlled remotely. In this mode, you can type the hotkey sequence followed by the number "0" (zero) at the shared keyboard of the active control port in order to "lock" the Switch. When you do so, the Switch blanks the screen, disconnects the keyboard and mouse from all of the computers, and displays the letter "P" on its front-panel display. Control can only be regained by typing the correct password on the keyboard.

To set this password, get into configuration mode, then type the letter "P" and press the [Enter] key. The Multi-Head ServSwitch will light the middle and bottom segments of its front-panel display, so that it resembles a wide equals sign, and you can then type your password. The password is not case-sensitive and can be any combination of keystrokes, including function keys but excluding [Ctrl], [Alt], [Shift], and [Enter]. (For example, the password [F4] [F] [R] [E] [D] [Home] would be valid.) When you've finished typing in your password, press [Enter] to save it to the Switch's EEPROM. (This type of memory does not depend on active power or even a battery backup, so it can persist indefinitely.) Don't worry if you type the password incorrectly; you can always re-enter it, even if you've exited and re-entered configuration mode. (The exception to this is if somebody locks the Switch, and you discover only then that you messed up entering the password or can't remember what the password is. At that point, you'll have to power down the Switch and hold down its front-panel pushbutton while powering it back on to get back into configure mode—as described in **Section 4.2.1**—in order to change the password.)

If you want to remove the password after setting one, get into configuration mode, type the letter "P", and press the [Enter] key as before, but then press [Enter] again without typing in any other characters. (If you try to lock the Switch before you've set a password, or after you've removed the password, the Switch will still blank the video, but it won't prevent someone from selecting another channel.)

4.2.10 Exiting Configuration Mode

When you've finished configuring the Multi-Head ServSwitch, simply type the letter "E" and press [Enter]. The Switch will exit the configuration mode and return to normal operation. The attached computers can now be switched on.

5. Operation

This chapter explains how to operate the Multi-Head ServSwitch. Please read this chapter carefully before starting to use the Switch; also make sure you have read the important note at the start of **Chapter 4**.

5.1 Power Status

At power-up, the Multi-Head ServSwitch will try to select CPU channel #1 unless (a) a password has been set or (b) the Switch isn't getting enough power to operate properly. Watch the Switch's front-panel 7-segment display, as described in Figure 5-1: If the Switch is not receiving enough power, the display will be blank; if the Switch can select CPU 1, the display will show "1"; or if a password has been set, the Switch will display "P" and remain locked until a valid password is entered. (For the meaning of this display after power-up, see **Section 5.3**.)

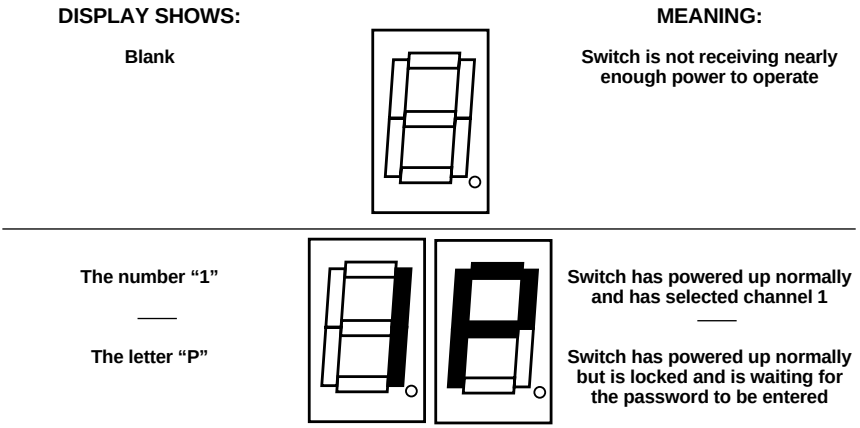

DISPLAY SHOWS:
MEANING:
Blank
Switch is not receiving nearly enough power to operate
The number "1"
Switch has powered up normally and has selected channel 1
The letter "P"
Switch has powered up normally but is locked and is waiting for the password to be entered

Figure 5-1. The front-panel status display at power-up.

5.2 The Front-Panel Pushbutton and the Remote-Control Module

You can use the Multi-Head ServSwitch's front-panel pushbutton to select which CPU channel (CPU port) is currently controlled by the active control port. Press the key once during normal operation to select the next CPU channel in sequence (for example, to select channel 4 if channel 3 is currently selected); press the key repeatedly to manually cycle through the channels.

You can also use this button to access the Multi-Head ServSwitch's configuration mode (see **Section 4.2.1**). To access configuration mode while the Switch is operating, press the button and hold it down for 5 seconds until "C" appears on the Switch's front-panel display.

An optional Remote-Control Module ("RCM") is also available for the Multi-Head ServSwitch. It's a small hand-held component—with a SELECT key that mimics the Switch's pushbutton and an identical copy of the Switch's front-panel display—whose cord you can plug into the Switch's RS-232 port. This is particularly useful in applications where the Multi-Head ServSwitch is located some distance from the shared keyboard, mouse, and monitors. The RCM can be conveniently attached to your keyboard with the included Velcro strips so you can have channel information and channel-selection control at your fingertips.

At the time of this writing, four different models of the Remote-Control Module are available, each with a different cord length: 10 ft. (3 m, product code KV6REM), 25 ft. (7.6 m, KV6REM-25), 50 ft. (15.2 m, KV6REM-50), and 75 ft. (22.9 m, KV6REM-75).

5.3 The Status Display

The Multi-Head ServSwitch's front-panel 7-segment status display usually shows the number of the currently selected computer channel, while the dot LED alongside it flashes in response to data from the shared keyboard or mouse (see the top illustration in Figure 5-2). If you select autoscan mode, however, the display will alternately (a) display the current channel number and (b) light each of its outer six LED segments, one after the other, in a clockwise sequence, as shown in the second illustration. If the Switch is in configuration mode, it will display "C". If the Switch has been locked, it will display "P" until a valid password has been typed to unlock the Switch. Finally, if the screen-saver mode has been activated, the channel number will flash.

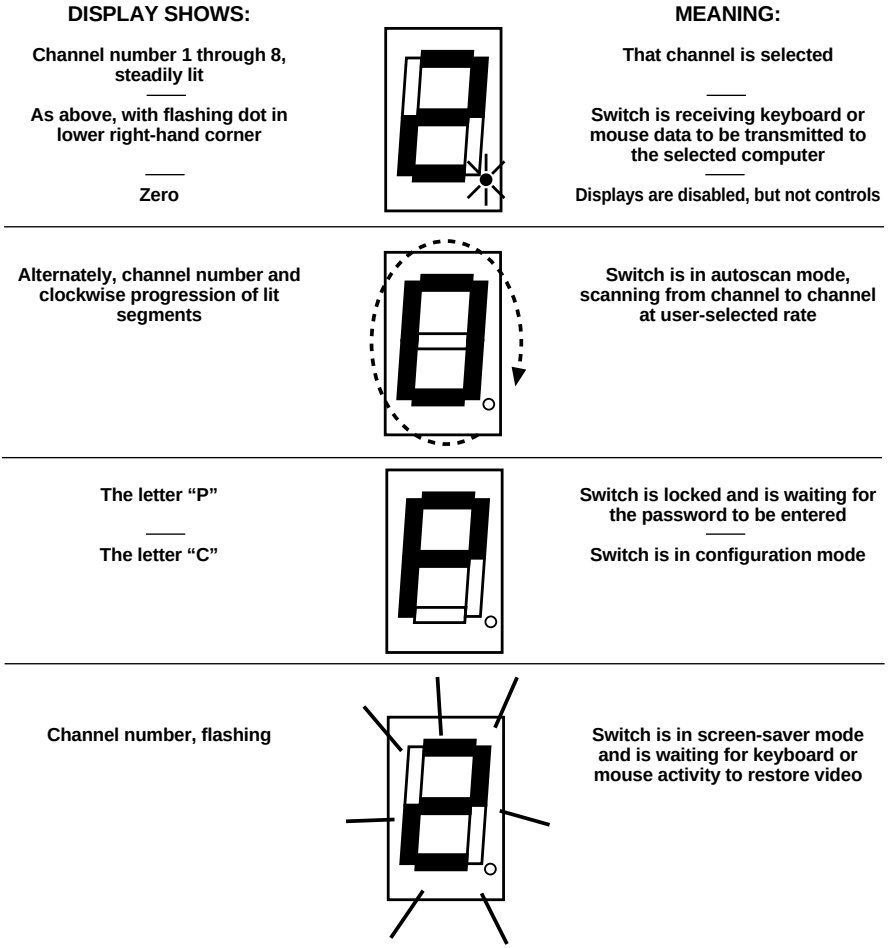

DISPLAY SHOWS:
MEANING:
Channel number 1 through 8, steadily lit
That channel is selected
As above, with flashing dot in lower right-hand corner
Switch is receiving keyboard or mouse data to be transmitted to the selected computer
Zero
Displays are disabled, but not controls
Alternately, channel number and clockwise progression of lit segments
Switch is in autoscan mode, scanning from channel to channel at user-selected rate
The letter "P"
Switch is locked and is waiting for the password to be entered
The letter "C"
Switch is in configuration mode
Channel number, flashing
Switch is in screen-saver mode and is waiting for keyboard or mouse activity to restore video

Figure 5-2. The front-panel status display during regular operation.

5.4 Things to Keep in Mind About the Keyboards and Mice

CPU bootup sequence: When your computer CPUs are powered on, they communicate with any attached keyboards and mice and load the setup parameters required by their particular operating systems. It's necessary for the Multi-Head ServSwitch to be attached and powered on during this sequence so that it can give the CPUs the required responses and keep track of all the modes and settings requested by each of the connected CPUs.

Mouse characteristics: Do not unplug a PS/2 mouse connection from a computer CPU while the CPU is on. Because of the way PS/2 mice communicate, the CPU will lose mouse function and you will have to reboot the CPU to regain normal operation. Unplugging a shared PS/2 mouse from the Multi-Head ServSwitch will have no immediate effect, but the CPU will lose mouse function as soon as you plug the mouse back in. (RS-232 mouse-port connections can usually be freely unplugged and replugged, provided that a mouse was connected when the operating system initially booted.) The Multi-Head ServSwitch has a PS/2 mouse-recovery system which allows you to disconnect and reconnect the shared mouse without powering down the system, but we recommend using this only when absolutely necessary. See **Section 5.8** for details.

Keyboard- and mouse-mode handling during channel switching: The Multi-Head ServSwitch keeps a log of the keyboard and mouse modes and resolution settings requested by each of the connected computer CPUs, including the keyboard Num Lock, Caps Lock, and Scroll Lock states. These settings are automatically restored to the shared keyboard and mouse when the Multi-Head ServSwitch channel is switched, ensuring maximum software compatibility.

5.5 Keyboard Control: Hotkey Commands

You can control many functions on the Multi-Head ServSwitch—such as CPU-channel selection, autoscanning, or locking—from the keyboard, using commands triggered with the Switch's currently selected hotkey combination. All of the hotkey-control commands are invoked by holding down the one or two hotkeys and then pressing a command key. By default, the two hotkeys are [Ctrl] and [Alt], although other keystroke combinations can be selected (see **Section 4.2.7**).

Normally, when you send a hotkey command, you have to release the hotkeys and the command key before you can send another one. The one exception to this rule is {Hotkeys} + [Tab], the "switch to next CPU channel" command; you can "tab through" the channels by holding down the hotkeys and repeatedly pressing [Tab].

The hotkey commands are summarized below and on the next page. Note that to generate the numeric digits in the commands that contain them, you need to press the number keys on the top row of the main section of the keyboard, *not* the number keys on the keypad; the Switch will not recognize keypad numbers.

- Use {Hotkeys} + [*x*], where *x* is a number from one to two (on the 2-port models) or one to four (on the 4-port models), to switch to the corresponding CPU channel. If you try to select a channel with a higher number than the Switch has ports, the Switch will ignore the command and pass it through to the currently selected computer.

- Use {Hotkeys} + [Tab] to switch to the next channel in numeric sequence (if the Switch is set to "U7") or to the next *active* channel (if the Switch is set to "U8"); refer to **Section 4.2.7**.

- Use {Hotkeys} + [A] to have the Switch start autoscanning (briefly displaying the video from each CPU channel in turn). You can control whether or not it scans empty channels, and for how long it pauses at each channel, with the "L1" through "L4" and "T*x*" configuration commands respectively (see **Section 4.2.3**). To stop autoscanning, simply select a fixed channel using the Switch's front-panel pushbutton, the keyboard hotkeys, or the mouse (if mouse switching is enabled and the mouse is a 3-button or IntelliMouse type).

- Use {Hotkeys} + [0] to select nonexistent "channel zero" in order to shut off the video output from the Switch to the shared monitors. The Switch's front-panel display will show "0". You can re-enable video by selecting another channel through the keyboard, front-panel pushbutton, or mouse.

- Use {Hotkeys} + [L] to lock the Switch (disable its shared keyboard and mouse and select nonexistent "channel zero" in order to shut off the video output from the Switch to the shared monitors). If a password has not been set (see **Section 4.2.9**), the Switch behaves exactly as if you had entered {Hotkeys} + [0] (see above). If a password has been set, the Switch displays "P" to indicate that a valid password must be entered to unlock the switch; simply type in the password followed by the [Enter] key to do so. Note that if anyone has tried to type something at the shared keyboard while the Switch is locked, you will have to press [Enter] to clear those characters so that they won't invalidate the password when you proceed to type it in.

Examples of common hotkey commands (assuming the hotkeys are [Ctrl] and [Alt]):

- *To select channel 2:*
  Press and hold [Ctrl] and [Alt], press and release [2], release [Ctrl] and [Alt].
- *To "tab through" channels:*
  Press and hold [Ctrl] and [Alt], press and release [Tab] (repeat as many times as necessary), release [Ctrl] and [Alt].

5.6 Mouse Control

Yet another convenient way to select CPU channels on the Multi-Head ServSwitch is through a three-button mouse, if this feature is enabled (see **Section 4.2.6**). As shown in Figure 5-3 (button to hold down is black, button to click is gray):

- To switch to the *next* channel, hold down the central mouse button or "wheel" button, then click on the *left-hand* mouse button.
- To switch to the *previous* channel, hold down the central mouse button or wheel button, then click on the *right-hand* mouse button.

Depending on whether the Switch's set to "U7" or "U8" (see **Section 4.2.7**), the mouse will switch to either each channel in sequence or to *active* channels only.

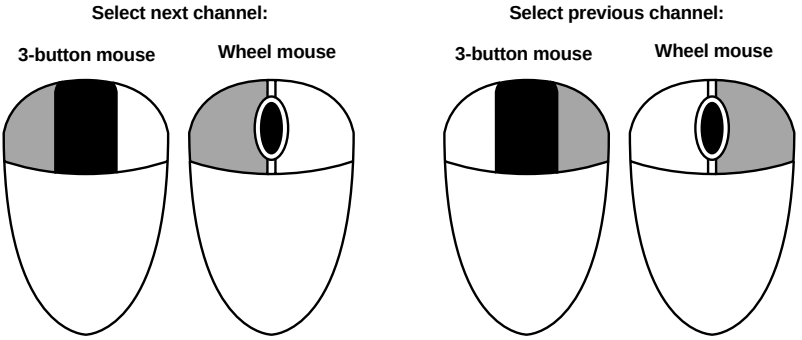


Figure 5-3. Using the mouse buttons for switching.

5.7 Re-Enabling a Disconnected PS/2 Mouse

If you accidentally disconnect the shared PS/2 mouse from the Multi-Head ServSwitch while the Switch is operating, the mouse will not work correctly when you plug it back in. To avoid having to reboot the entire system in this situation, the Switch has an automatic mouse-recovery system.

With the PS/2 mouse disconnected, change the channel using the Switch's front-panel pushbutton or the keyboard hotkeys. The Multi-Head ServSwitch detects that the mouse has been disconnected and triggers the automatic recovery system. Plug in the PS/2 mouse and the Multi-Head ServSwitch will re-initialize it.

Alternatively, you can reset the keyboard and mouse by holding the Switch's front-panel pushbutton down for five seconds to enter configuration mode, then releasing the button, then pressing the button again while the display shows "C". When you do, the Switch will perform a complete power-off reset of the connected keyboard and mouse. This function only resets the shared keyboard and mouse that are plugged into the control port; it does not affect the status of any of the other ports on the Switch or of the CPU connections.

5.8 Hot-Plugging Devices Into the Multi-Head ServSwitch and Re-Enabling Disconnected CPU PS/2 Mouse Ports

We suggest that you turn off the computers that will be connected to the Multi-Head ServSwitch before you install a Switch system. However, even if this is not possible, most systems can be "hot-plugged" (connected to the Switch while they are powered and operating); the PS/2 mouse-port malfunctions this usually causes can often be overcome by using the Multi-Head ServSwitch's mouse-restoration functions. (The keyboard connection will normally restore itself automatically.)

Let's take this from the top: On many computer CPUs, mouse movement will be lost if the PS/2 mouse is unplugged and plugged back in while the CPU is running. Mouse movement can then only be restored by rebooting the CPU. This is because the mouse drivers only set up and enable the mouse when the CPU is initially booted.

If you have powered down your Multi-Head ServSwitch, or if you are attempting to hot-plug a system into it, you might be able to restore lost mouse movement using the Multi-Head ServSwitch's mouse-restoration functions.

Important: Mouse-restoration functions should be used with caution, because unpredictable results might occur if the wrong mouse type is selected. If in doubt, restore the mouse by rebooting the CPU normally.

Standard PS/2 mouse data uses a different data format than IntelliMouse data, so two reset functions are provided on the Multi-Head ServSwitch. The type of data format expected by the CPU depends upon the driver and the type of mouse that was connected when the driver was booted. The following table may be used as a guide; note that the mouse-reset functions predict the likely mouse *resolution* settings but may not restore the *speed* or *sensitivity* of the mouse exactly as they were when the CPU originally booted:

Type of mouse/ system connected at bootup:	**Driver type:**	**Probable expected data format:**	**Suggested restoration command:**
PS/2	PS/2 only	PS/2	F5
PS/2	IntelliMouse	PS/2	F5
IntelliMouse	PS/2 only	PS/2	F5
IntelliMouse	IntelliMouse	IntelliMouse	F6

To restore lost mouse movement on a CPU connected to the Multi-Head ServSwitch:

1. Select the CPU that has lost its mouse movement.
2. Press and hold the pushbutton on the front of the Multi-Head ServSwitch for five seconds until “C” appears in the front-panel display. The Switch is now in configuration mode.
3. To restore a PS/2 mouse connection, type the letter “F”, then the number “5”, then [Enter]. Or, to restore an IntelliMouse connection, type the letter “F”, then the number “6”, then [Enter].
4. Exit from configure mode by typing the letter “E” followed by [Enter].
5. Test the mouse movement by moving the mouse a short distance.

5.9 RS-232 Control

There is yet one more way to select channels on the Multi-Head ServSwitch: through its RS-232 serial port. (This is a proprietarily pinned DB15 connector; see **Section A.3** of the **Appendix** for more information.) This connector serves more often as the attachment point for the Switch's optional Remote-Control Module, but by using an adapter you can connect a different RS-232 device to it. To select a channel through this port, the data rate and format of the sending device must be set to 1200 bps, 8 data bits, no parity, and 1 stop bit. No handshaking (flow control) is used by the Multi-Head ServSwitch.

Simply send the ASCII character for the channel which needs to be selected: ASCII "1" (31 hex, 49 decimal) will select channel 1, ASCII "2" (32 hex, 50 decimal) will select channel 2, and so on. The Switch will echo this character back to the sending device when the channel has been changed.

5.10 Performing a Warm Reset

Sometimes, when problems occur in a Multi-Head ServSwitch system, powering the Switch off and back on again can fix the problem. If a Switch is getting power from its optional power supply, you can do this by unplugging and replugging the power supply. But if the Switch is getting power from the attached computers, the only way to shut it down is to disconnect it from those computers or turn the computers off, which might not be desirable or possible.

Instead of powering the Switch off and back on to completely reinitialize it, you can accomplish the same results by having the Switch do a "warm reset" (hardware reset) while it's still operating. You'll see an 8-position DIP switch on the bottom of the Switch. Move position 8 of this switch (the rightmost one if you hold the Switch with its front panel facing the ceiling) to the ON (up) position to make the Switch halt; move position 8 back to OFF (down) to reset the Switch and return it to normal operation.

Even though the Switch doesn't have any CPU startup communication to work with after a warm reset, it should still be able to autodetect the correct keyboard mode and mouse type under most circumstances. Occasionally, however, you'll also need to do a mouse reset and/or recovery (see **Sections 5.7** and **5.8**) to get the mouse working properly.

Note: Aside from position 8 and position 7 (used for firmware upgrades, as described in the next section), all of the positions of the Switch's DIP switch are reserved for future use. Do *not* change their settings.

5.11 Upgrading the Switch's Firmware

Because the Multi-Head ServSwitch stores most of its firmware (its "operating system," if you will) in flash memory, the firmware is upgradable. To fix bugs in existing firmware, or to add features to your Switch, Black Box Technical Support might sometimes recommend that you upgrade the Switch's firmware if a newer revision is available. (Follow the procedure described in **Section 4.2.8** to find out which firmware version your Switch is currently running.)

To upgrade the Switch's firmware, you'll need a "host PC," which must be an IBM PC compatible computer with an RS-232 serial port. This computer must be running an operating system that can execute DOS programs, such as MS-DOS® or Windows® 3.x, 95, 98, or 2000. You'll also need a DB9 female to DB15 male firmware-upgrade cable (product code KV6SER) to transfer the firmware files to the Switch. (Refer to the **Appendix** for the pinning of this cable.)

Take these steps:

1. Download the firmware-installation/verification program (probably named "SSW*xyz*.EXE") and the firmware binary itself (probably "SSW*xyz*.HEX") from our Web site at **www.blackbox.com** onto the host PC. If you can't find these files on our Web site, Tech Support can help. (In these filenames, *xyz* = the *x.yz* firmware-revision level; for example, "SSW118.EXE" would be the installation program for firmware revision 1.18.)

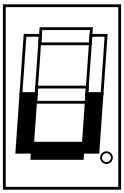
2. Run the firmware-upgrade cable from the host PC to the OPTIONS port on the Multi-Head ServSwitch.

3. There is an 8-position DIP switch on the bottom of the Switch. Move position 7 of this switch (the next-to-the-rightmost one if you hold the Switch with its front panel facing the ceiling) to the ON (up) position to set the Switch to "upgrade mode."

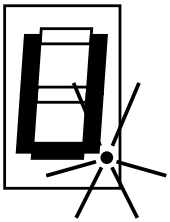
4. Do a full reset of the Switch: Either power it down and back up again, or move position 8 of its DIP switch to the ON (up) position and back to OFF (down) to do a warm reset (see **Section 5.10**).

At this point, make *very sure* that the Switch is receiving adequate power. The upgrade program monitors the Switch's voltage and won't allow an upgrade to proceed if the voltage is insufficient. If you're using the Switch's optional power supply, it's definitely going to get the power it needs. If it's being powered by the attached computers, it's normally possible to perform an upgrade when the Switch is powered by a single computer, but it's a good idea to power up all of the computers attached to the switch anyway. This minimizes the possibility that power will fail during an upgrade due to a sudden brownout, cable disconnection, etc.

The Multi-Head ServSwitch's front-panel 7-segment display should now show a lowercase "u" to indicate that the Switch is ready to be upgraded:



5. Run the SSW*xyz*.EXE firmware-upgrade program that you downloaded in step 1. Follow the directions that appear on the host PC's screen to transfer the new firmware to the Switch. The Switch's 7-segment display will change to show an uppercase "U" and its dot will flash to show that the Switch's receiving data from the PC:



6. When the upgrade's complete, the 7-segment display will change back to the lowercase "u" and the dot will stop flashing. Move position 7 of the Switch's DIP switch back to OFF (down) to return the Switch to normal operation.

CAUTION—if the upgrade goes wrong:

The upgrade program rewrites the Switch's existing firmware code with the code in the SSW*xyz*.HEX file. If the upgrade process is interrupted, the Switch will contain invalid code and will not operate properly. A partial, interrupted, or failed upgrade can be fixed, but only if you *immediately* repeat the upgrade process *without* turning OFF position 7 of the Switch's DIP switch. (The code that the Switch uses to download new firmware is not itself affected by the upgrade process.) If you move position 7 back to OFF after a failed upgrade attempt, the Switch will begin running the incomplete code. This could have unpredictable results and might damage your Switch or the attached equipment!

7. Verify that the upgrade has been successful by having the Switch indicate its new firmware revision as described in **Section 4.2.8**.

6. Troubleshooting

6.1 Things to Try

This section suggests possible answers for a number of problems that people sometimes encounter when trying to operate the Multi-Head ServSwitch. If the suggested actions don't solve your problem, or if you don't see a listing for the type of trouble you're having, contact Black Box Technical Support as described in **Section 6.2**.

Problem:
Poor video quality with smearing, fuzziness, or rippling.

Possible Solution:
Use shielded or screened coaxial video cables to connect your devices to the Multi-Head ServSwitch.

Problem:
Your mouse does not move the cursor/pointer.

Possible Solutions:
If you move the mouse and the activity indicator (the dot on the 7-segment display) does not flash, then the Multi-Head ServSwitch is not receiving data from the mouse. Check the mouse's connection to the Switch; if it's OK, try resetting the mouse using the reset function (see **Section 5.7**), warm-resetting the Switch (see **Section 5.10**) or powering the Switch OFF and then ON again. If you are attempting to connect the Switch to a CPU with a PS/2 mouse connection that has not been powered down, you will need to use the mouse-restoration function F5 or F6 (see **Section 5.8**).

Make sure that the selected computer's software is configured to accept a Microsoft compatible PS/2 mouse of the type that you have connected.

Make sure that (a) the mouse and computer were both connected to the Multi-Head ServSwitch before any part of the system was powered up, and (b) the Switch was powered ON before the attached computer. If you're not sure whether this was the case, then (if it's possible to do so) power everything down, make sure all cable connections are correct and secure, power up the Switch, then power up all attached computers.

Problem:
Your keyboard does not function or functions only intermittently. The Num Lock LED does not always light when the Num Lock key is pressed.

Possible Solution:
Some older keyboards were designed for use with specific computers and are not truly PC/AT or PS/2 compatible. These are not common, but if you're having problems like this and you're using an old keyboard, try a newer keyboard.

Problem:
Just using your mouse normally causes the CPU channel to change unexpectedly.

Possible Solutions:
Some cheaper mice are not fully compatible with the Multi-Head ServSwitch and can lose data, which—if mouse switching is enabled (see **Section 4.2.5**)—sometimes causes the Switch to interpret a data stream as a channel-change request. Try using a Microsoft, Logitech, IBM, Compaq®, or Hewlett-Packard® mouse instead.

Make sure that you are using a Microsoft compatible mouse driver on your PC. Some drivers by other manufacturers can cause the mouse to use proprietary mouse-data formats that the Switch doesn't support. If you have unplugged and reconnected a mouse to the Multi-Head ServSwitch, make sure that you reset it (see **Section 5.7**) or—especially if the mouse is an IntelliMouse—use the mouse-restoration function (see **Section 5.8**).

Problem:
The mouse moves very slowly but otherwise functions correctly.

Possible Solutions:
Change to a Microsoft mouse driver or set the Switch to the "L6" configuration option. See **Section 4.2.4**.

Problem:
The cursor/pointer jumps around the screen after you disconnect the mouse cable or power down the Multi-Head ServSwitch.

Possible Solutions:
If you have disconnected and reconnected a CPU mouse cable or you have powered down the Multi-Head ServSwitch, and you're using a PS/2 mouse or IntelliMouse, the mouse might have gotten out of sync with the CPU. Try the mouse-reset function (see **Section 5.7**) or the mouse-restoration function (see **Section 5.8**), or reboot the CPU.

Problem:
Compaq MX11800 model integrated keyboard and mouse only: The mouse consistently fails to boot when the Switch is connected to PCs running Windows NT 4.0 through their PS/2 style mouse ports.

Possible Solutions:
There are three possible solutions to this problem:

1. Use a different type of mouse.
2. Connect the Switch to your NT 4.0 PCs through adapters and their serial ports rather than through their PS/2 ports.
3. Select channel 0, or another channel that is not connected to an NT 4.0 PC, while NT is booting. You should be able to use the system normally once the logon screen appears.

6.2 Calling Black Box

If you determine that your Multi-Head ServSwitch is malfunctioning, *do not attempt to alter or repair it*. It contains no user-serviceable parts. Contact Black Box Technical Support at 724-746-5500.

Before you do, make a record of the history of the problem. We will be able to provide more efficient and accurate assistance if you have a complete description, including:

- the nature and duration of the problem;
- when the problem occurs;
- the components involved in the problem—that is, what types of computers, what type of keyboard, brand of mouse, make and model of monitor, etc.;
- any particular application that, when used, appears to create the problem or make it worse; and
- the results of any testing you've already done.

6.3 Shipping and Packaging

If you need to transport or ship your Multi-Head ServSwitch:

- Package it carefully. We recommend that you use the original container.
- Before you ship the Switch back to Black Box for repair or return, contact us to get a Return Authorization (RA) number.

Appendix: Cable Guidelines

IMPORTANT NOTE

The maximum supported cable lengths vary widely between devices and cables. It might be possible to use cables that are longer than those specified in this Appendix with certain computers and peripherals, but this can't be guaranteed. If you have problems, try using shorter cables.

A.1 Cabling from the Keyboard, Mouse, and Monitors to the Multi-Head ServSwitch

All of the shared devices plug directly into the relevant ports at the rear of the Multi-Head ServSwitch. If you use a PC/AT style keyboard you'll need a PC/AT (5-pin DIN female) to PS/2 (6-pin mini-DIN male) adapter. (These are available from Black Box as product code FA211.)

If you're *not* using the optional power supply, these peripherals' cables should be no longer than 6 ft. (2 m). If you *are* using the power supply, you can use Premium KVM User Cables (product code EHN409) to increase the distance from the Switch to your peripherals to as much as 32 ft. (10 m); see **Section 3.3.3**. Many keyboards and mice will operate at distances up to 65 ft. (20 m), but don't count on this.

A.2 Cabling from the Multi-Head ServSwitch to the CPUs

Video cabling: HD15 male to HD15 male, wired as a standard VGA CPU-to-monitor cable. There are two types commonly available. The better type, which will carry video very well, is constructed with a coaxial cable core. The not-so-good type—cheaper cable more suited for data communication—is often used, but can degrade video quality, especially over longer distances. Avoid using "data cables" longer than 6 ft. (2 m) unless video quality is not important in your application.

If you are *not* using the Switch's optional power supply, the video-extension cable should be no longer than 16 ft. (5 m) in any situation. If you *are* using the power supply, you might be able to run good coaxial video cables as far as 165 ft. (50 m) with little loss of video quality, but the longest we recommend going—unless you use a ServSwitch brand KVM Extender—is 100 ft. (30 m) over the video strand of our Premium KVM CPU Cables (EHN408; see **Section 3.3.3**) and/or VGA-extension cables (EVNPS05-MM).

If you want to make use of the Multi-Head ServSwitch's ability to pass Display Data Channel (DDC) information between your CPUs and your monitors, you'll need a cable that carries the DDC signaling lines (HD15 pins 12 and 15), which not all video cables do.

Keyboard- and PS/2 mouse-extension cabling: 6-pin mini-DIN male to 6-pin mini-DIN male with all lines connected straight through (1 to 1, 2 to 2, etc.). If the PC has a 5-pin DIN PC/AT style keyboard connector, you will need a PS/2 to PC/AT keyboard adapter, 6-pin mini-DIN female to 5-pin DIN male (FA212).

If you're *not* using the Switch's optional power supply, the keyboard- and mouse-extension cables should be no longer than 16 ft. (5 m) in any situation. If you *are* using the power supply, you might be able to run keyboard- and mouse-extension cable—such as PS/2 extension cables (EVNPS03-MM) or the keyboard and mouse strands of our Premium KVM CPU Cables (EHN408; see **Section 3.3.3**)—as far as 100 ft. (30 m).

Cabling to CPUs' RS-232 serial mouse ports: You'll need PS/2 extension cabling as described above, plus a special adapter with the pinning shown in Figure A-1 on the next page (FA314), to connect the Multi-Head ServSwitch's PS/2 mouse port to the RS-232 port on a PC.

As noted above, PS/2 extension cables and the mouse strand of our Premium KVM CPU Cables should be no longer than 16 ft. (5 m) if you're *not* using the optional power supply or 100 ft. (30 m) if you *are*. If you're using an adapter at the Switch end instead of the PC end and are running regular RS-232 cable, this cable should not be longer than 16 ft. (5 m) if you're *not* using the optional power supply or 50 ft. (15 m) if you *are*.

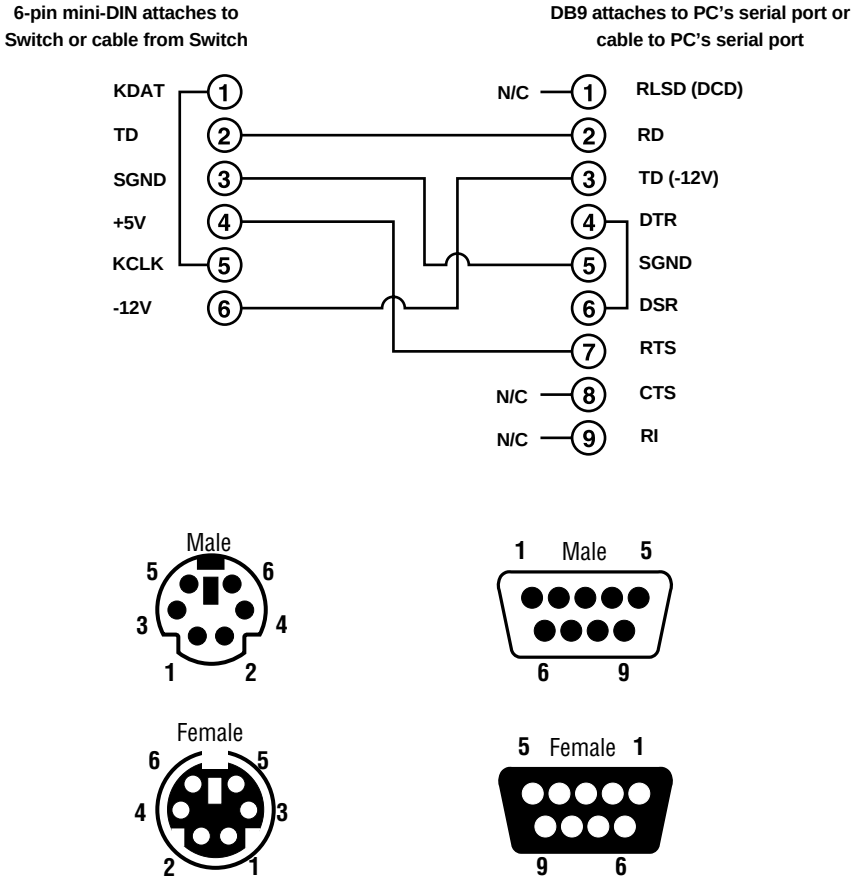


Figure A-1. The RS-232 mouse adapter's pinout.

A.3 Cabling Attached to the OPTIONS Port

The DB15 connector labeled "OPTIONS" on the back of the Multi-Head ServSwitch is a proprietarily pinned port using RS-232-type signaling. You can connect any of these devices to it:

- The Switch's optional Remote-Control Module (RCM, see **Section 5.2**);
- An RS-232 device for serially controlled channel switching (see **Section 5.9**);
- Another Switch, to create a synchronized system for CPUs with as many as eight video outputs (see **Section 3.3.2**); or
- A PC, in order to upgrade the Switch's firmware (see **Section 5.11**).

The pinout of this connector is pretty simple: Pin 9 (Signal Ground, SGND), Pin 10 (Transmit Data, TD), and Pin 11 (Receive Data, RD) are the only pins used for serial communication to PCs, other Switches, and RS-232 devices. All other pins are intended for RCM communication only and should be left unconnected; attaching them to any other RS-232 equipment could have unpredictable and possibly damaging effects.

The pinout for a synchronization cable is shown in Figure A-2 on the next page. We can offer this cable as a special quote, but it's not a stock item at the time of this writing. The pinout for a firmware-upgrade cable (product code KV6SER) is shown in Figure A-3.

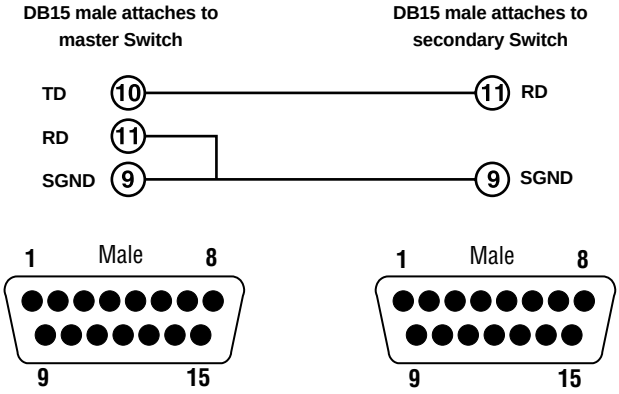


Figure A-2. The synchronization cable.

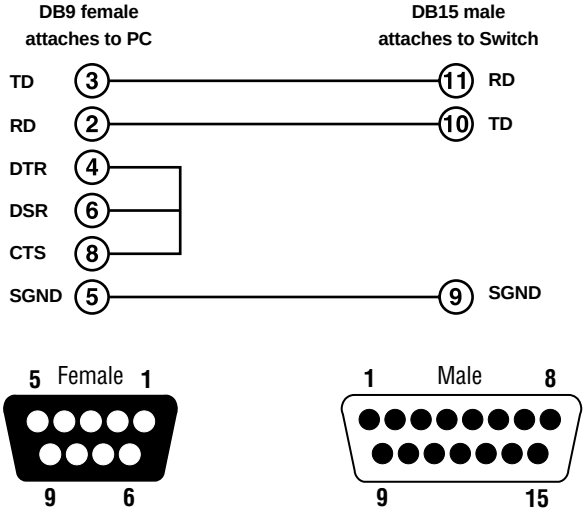


Figure A-3. The firmware-upgrade cable KV6SER.

DISCLAIMERS

While every precaution has been taken in the preparation of this manual, neither the manufacturer nor its authorized agents assume any responsibility for errors or omissions. Nor do they assume any liability for damages resulting from the use of the information contained herein. They reserve the right to change the specifications, functions, or circuitry of the product without notice.

Neither the manufacturer nor its authorized agents accept liability for damage due to misuse of the product or due to other circumstances outside their control. And they will not be responsible for any loss, damage, or injury arising directly or indirectly from the use of this product.

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